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E. J. Simpson

WILL PRAIRIE SOILS WEAR OUT ?



Photo by R. D. BIRD

The soil in this Manitoba field is
already practically worn out.

THE NORTH-WEST LINE ELEVATORS ASSOCIATION
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Will Prairie Soils Wear Out ?

K W. NEATBY

INTRODUCTION

While travelling in southern Manitoba last summer, the author encountered several districts in which soil erosion was obviously doing serious damage. In one district, a part of which is illustrated on the front cover, the uplands on many farms had lost most or all of the top soil. Not only was this apparent from the mottled colour of summerfallowed fields, but, also, from the pale green, stunted appearance of the crops on knolls and side-hills.

The condition seemed so serious that a letter was addressed to Dr J. L. Doughty, Senior Soil Specialist, Dominion Soil Research Laboratory, Swift Current, Saskatchewan, suggesting that he visit the area and investigate the problem. Dr. Doughty surveyed the district a few days later, and collected samples for the purpose of estimating the losses in fertility due to erosion. His report follows. It should be read carefully by all those whose interest in the future of Canadian agriculture is genuine.

Some Effects of Erosion on Soil Composition

J. L. DOUGHTY,

Soil Research Laboratory,

SWIFT CURRENT, SASKATCHEWAN.

Small areas are frequently observed, especially in rolling country, where the soil is much lighter in colour than the rest of the field. Such areas have generally been caused by erosion, part or all of the surface soil having been removed by wind or water and the lighter coloured lower horizons of the soil exposed. The eroded areas are generally less productive than the adjacent darker coloured soils, the crops being shorter, thinner and lighter in colour.

Data are presented in the accompanying table showing some of the differences in chemical composition of soils and crops from eroded and uneroded areas. Sample A of each pair represents the light coloured area and B the adjacent darker coloured soil taken within 15 or 20 feet of A.

The data show that the soils from the light coloured areas were all lower in nitrogen and organic matter than the adjacent darker soils. The nitrogen content of the crops grown on the lighter coloured areas was also lower than in the adjacent crop indicating a lower

feeding value than the crops produced on the darker soil with the higher nitrogen content.

The total phosphorus in the soils showed only minor variations between paired samples, being just a little higher in the uneroded areas. The crops showed no consistent variation in phosphorus content that could be attributed to differences in the composition of the soil.

Laboratory tests of the ability of these soils to form nitrates indicated that there was not much difference between samples from the same location. However, there was some difference in the rate at which atmospheric nitrogen was fixed indicating that the darker soils had a more active nitrogen fixing flora.

The application of inorganic nitrogenous fertilizers to the eroded areas would compensate for the lack of nitrogen in the soil and likewise influence the nitrogen content of the crop. This would have only a temporary effect and the fertilizer would have to be applied each year. A heavy application of manure would be more effective for it would increase the nitrogen and organic matter content of the soil and supply fresh material as a source of energy for bacterial action. The manure would also tend to prevent erosion and increase the water holding capacity of the soil.

**Chemical composition of soils and crops from
eroded (A) and non-eroded (B) areas**

Sample	SOIL			CROP	
	Organic Matter %	Nitrogen %	Phosphorus %	Nitrogen %	Phosphorus %
1 A	3.70	0.195	0.047	1.29	0.238
1 B	4.14	0.246	0.051	1.49	0.199
2 A	2.0	0.129	0.070	1.45	0.173
2 B	5.0	0.264	0.082	2.35	0.206
3 A	1.09	0.061	0.053	1.27	0.205
3 B	2.60	0.106	0.059	1.69	0.204
4 A	2.58	0.162	0.053		
4 B	5.76	0.317	0.053		
5 A	1.43	0.092	0.051		
5 B	2.12	0.120	0.054		

CONCLUSION

The answer to the title of this leaflet is "Yes". The results of Dr. Doughty's experiments leave no doubt of this fact. Obviously some soils will last much longer than others when fertility maintenance is neglected. It will take many years of straight grain farming to effect the damage caused by a few hours of soil blowing or erosion due to torrential rains.

The reader is advised to examine the figures in the table carefully. It is apparent that yields will be seriously affected by the losses in organic matter and nitrogen, and the feeding value of the crops materially reduced.

It is perhaps even more important to bear in mind that eroded soils absorb moisture less readily than do non-eroded soils, and drought problems are thereby increased. Also, once a field has suffered from erosion it is more susceptible to damage than if it had not.

The problems involved in controlling erosion are many, and vary with the district and the resources of the farmer. This does not, however, justify delay. All farmers faced with the menace of erosion should consult the local agricultural representative and the nearest experimental farm.

Note:—Last year a well illustrated bulletin entitled "Water Erosion of Soils in the Prairie Provinces" was published by this Department. Copies may be obtained from the Agricultural Department, The North-West Line Elevators Association Winnipeg, Manitoba.

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